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ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

## A Sex-Lure Trap for *Rhyacionia* Tip Moths

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An inexpensive sex-lure trap is constructed from an ice-cream carton and a board supported on a stake. Caged virgin female moths lure low-flying males to the trap.

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Insect sex-lure traps are useful for survey purposes, especially in areas with low insect populations. They are also useful for determining seasonal appearance of adults, their flight periods or periods of attraction, mating behavior, and flight response distances. The effectiveness of control measures directed at the adult stage can be tested with sex-lure traps. Traps placed in treated areas following control measures should give an index of the remaining residual populations.

A variety of sex-lure traps have been designed for trapping forest insects. These include board traps, cylindrical cardboard traps, screen-grid traps, and box traps. Basic components are: (1) a trapping surface (board, cylinder, etc.); (2) a sticky substance for ensnaring insects; and (3) a bait or lure. Virgin female insects are often used as bait because they emit

odors or pheromones which attract males to the trap. For some forest insects, synthetic lures have recently been developed that duplicate or exceed the attractiveness of natural pheromones. Traps baited with virgin females require an additional component—a cage. Cages should confine the insects but permit the emitted pheromone to escape and disperse. For field placement, traps are usually suspended from branches, nailed to trees, or fastened to self-supporting structures such as rods, stakes, or platforms.

Boards and cylindrical cartons are most commonly used for trapping forest Lepidoptera. Modified board traps, similar to the one described by Coppel et al. (1960), have trapped the eastern spruce budworm, *Choristoneura fumiferana* (Clem.) (Greenbank 1963, Miller and McDougall 1973), the western spruce budworm, *C. occidentalis* Freeman (McKnight 1971), and the Nantucket pine tip moth, *Rhyacionia frustrana* (Comstock) (Wray and Farrier 1963, Manley and Farrier 1969). These board traps were either hung from branches or nailed to infested trees.

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In plantations and natural regeneration areas where only small trees are available, additional supporting structures may be needed. Also, in windy regions, branches may be whipped against traps hung within trees or nailed to tree boles. This Note describes an inexpensive sex-lure trap, independently supported, and suitable for baiting with live virgin female moths. It has been successfully used for trapping males of the southwestern pine tip moth, *Rhyacionia neomexicana* (Dyar), in windy regions near small trees (fig. 1).

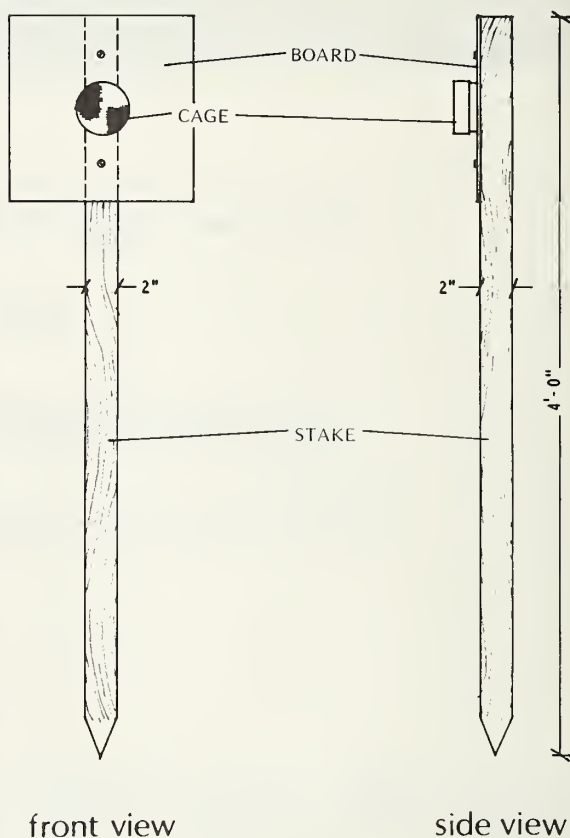


Figure 1.—Sex-lure trap baited with one virgin *Rhyacionia neomexicana* female (inside cage). Attracted males are stuck on board.

### Description

The trap (fig. 2) consists of a 1 ft<sup>2</sup> piece of  $\frac{1}{8}$ -inch exterior hardboard mounted on a 2- by 2-inch stake 4 ft long. For ease in recognizing trapped insects, the smooth side is painted with fast-drying white enamel. Two No. 10,

1-inch panhead tapping screws fasten the board to the stake. A small cage for holding virgin female moths is mounted in the center of the board.



front view

side view

Figure 2.—Construction details for the stake.

The cages are made from cylindrical 1-pint ice-cream cartons cut down to about 1 to 1½ inches in height (fig. 3). The flat center of the carton lid is punched out and replaced with 18-by 16-mesh fiberglass screen glued into the inner rim groove of the lid. The cage base is mounted to the board and stake with one or two No. 6,  $\frac{1}{2}$ -inch panhead tapping screws.

Some newer ice-cream cartons have a lip around the outer edge of the top. Since this lip is removed when the carton is cut down, the outside diameter of the base section will need to be increased slightly to insure that the screen lid fits snugly. We have successfully used rubber bands; other materials could no doubt also be used.

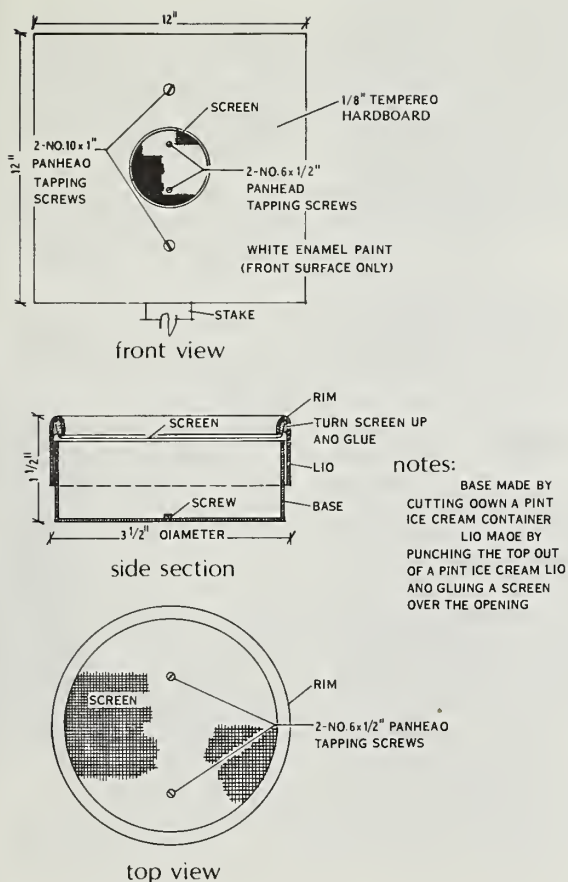


Figure 3. —Construction details for the board and cage.

### Materials List

- 1 stake, 2 by 2 inches by 4 ft long, sharpened at one end
- 1 board, 1 ft<sup>2</sup>, 1/8 inch exterior hardboard, smooth side painted white
- 1 cylindrical 1-pint ice-cream carton, base cut down to 1 to 1 1/2 inches in height
- 1 fiberglass screen, 4 inches diameter, 18 by 16 mesh
- 2 screws, No. 6, 1/2-inch panhead tapping
- 2 screws, No. 10, 1-inch panhead tapping
- 1 tube glue, waterproof
- 1 can fast-drying white enamel paint
- 1 can sticky material (Tree Tanglefoot, Stickem Special, Tack Trap, or similar substance)

Materials cost about 50 to 75 cents per trap. After the cutting, painting, and gluing operations, traps can be assembled in a few minutes.

### Installation and Field Use

Before installation, stakes are marked 1 ft above the sharpened end. A shovel works best for rapid installation. The trap stake can also be driven with a sledge. But if it is driven into hard, rocky ground, the cage should be removed first to prevent damage.

A thin coating of sticky material is spread on the painted side of the board around the cage. Care must be taken to keep the sticky material away from the fiberglass screen and the cage interior. Scrapers with 3-inch blades are useful for spreading sticky materials.

Cages are baited with live virgin female moths. From one to three tip moths have been placed in each cage, although the cages are large enough to accommodate many more moths without crowding. To make certain only virgin females are used, pupae are sexed by position and configuration of the genital pore (Jennings 1974), and females are reared at room temperature. Emerging females are collected in dry, 2-dram shell vials for transferring to the trap cages.

Traps should be serviced daily or at intervals of not more than 3 to 4 days during peaks in male flight activity. Males can be removed from the sticky material with laboratory teasing needles. If males are to be kept for future reference, they can be placed on strips of paper and then put into vials containing 70 to 80 percent ethanol. Moths can be temporarily stored on 3- by 5-inch cards in file boxes with corrugated cardboard partitioning strips (fig. 4).

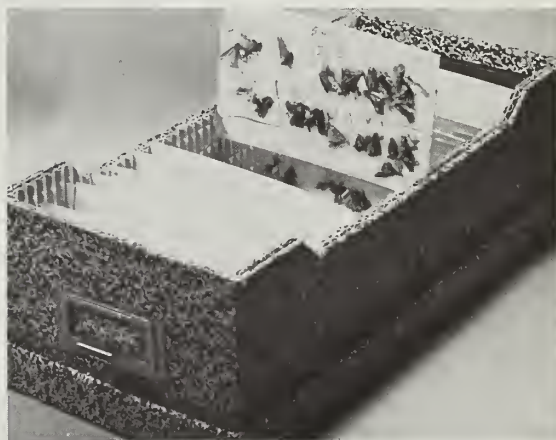


Figure 4.—Male moths can be stored temporarily on 3- by 5-inch cards in a file box with corrugated cardboard partitioning.

When the trapping response is heavy, the sticky material becomes coated with moth scales and wing fragments from removed males, plus debris. The sticky material may need to be re-spread or a new coat of material added.

These sex-lure traps have been used in studies to determine the flight behavior and periods of attraction of the southwestern pine tip moth at Chevelon, Arizona. As many as 255 males have been trapped overnight on a single trap. Traps baited with *R. neomexicana* virgin females attract only *R. neomexicana* males. When nearby traps are baited with virgin females of a related new species of *Rhyacionia*, only males of the new species are attracted.

These traps have also been used to study flight behavior and attraction of two sod webworm species inhabiting ponderosa pine forests (Krehoff 1974). Perhaps they will be useful for studying other low-flying forest Lepidoptera.

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